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## Cognitive Map – an example of practical use

### Chemistry lesson

Cognitive map of the task used on chemistry lesson – please, watch the film „Mediation during chemistry lesson“

*Cognitive map helps us to analyze the learning experience. It uses seven aspects.*

**1) Content (the subject matter):**

- modification of chemical equations;
- conservation law for mass;
- number of atoms of chemical elements in molecules
- notation of number of atoms and number of molecules
- experiencing chemical notations

**2) Modality (language or variety of languages used for receiving information and expressing the results):**

- Spatial model
- Pictorial
- Symbolic
- Verbal

**3) Phase of the mental act:**

- Input (data gathering)
  - Clear and detailed perception
  - Systematic exploratory behavior
  - Well-developed verbal tools
  - Conservation of constancies
  - Need for precision and accuracy in data gathering
- Elaboration (organizing and analyzing the data)
  - Ability to identify and define the problem
  - Well-developed spontaneous comparative behavior
  - Broad mental field
  - Ability to use inferential-hypothetical thinking
  - Well-developed summative behavior
  - Well-developed planning behavior



- Output (expressing the conclusion)
  - Ability to communicate well-elaborated responses
  - Need for precision and accuracy in communicating the response
  - Ability to project virtual relationships
  - Well-developed self-regulation and ability to avoid trial-and error response
  - Well-developed functions of visual transport
- 4) Cognitive operations (activity of the brain during the elaboration phase in order to generate new information):**
  - Identifying
  - Differencing
  - Counting
  - Comparing
  - Analogical thinking
  - Analyzing
  - Deducing
  - Inducing
- 5) Level of Complexity (quantity and novelty of information to be handled in a mental act)**

Moderate to high –

  - New elements: notation of chemical equation, conservation law for mass
  - Need to keep in mind: the number of atoms in the molecule, the number of molecules, conservation law for mass
- 6) Abstraction (how close the mental act is to the subject at hand):**
  - High without the model and pictorial help
  - Thanks to different modalities lower
- 7) Efficiency (speed, accuracy, perceived level of difficulty):**
  - Thanks to different modalities helping to clarify the subject the efficiency is high
  - Without these modalities and clarity, the efficiency is lower or low

*The cognitive map describes the nature of the task the child is confronted with. The responses of a child indicate the level of cognitive functions the child can use. The combination of both factors – task and individual – illustrate the reasons for success or failure in solving the task.*